Cisco Lab@Politecnico di Torino

Fulvio Risso

http://staff.polito.it/fulvio.risso/

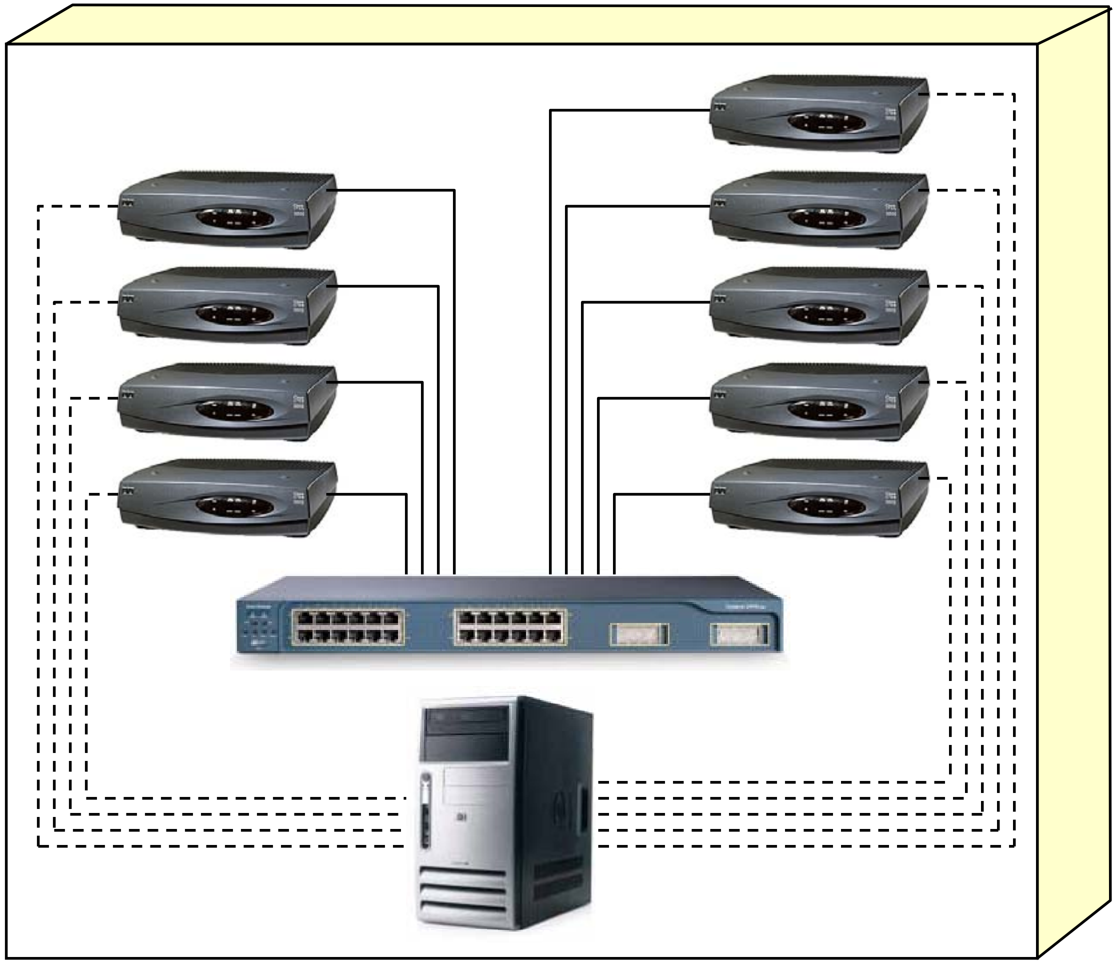
Main objectives

- **Main use: teaching**
  - So, features, not performances
- **Not experimental devices, but what students will use in their work life**
  - Students are happier
  - Total cost of ownership (install/restore)
  - Simpler CLI (compared to using several LInux daemons)
  - More features
  - Smaller (and less power hungry)
  - Not very expensive
- **Easier to manage**
  - Everyday use (student accounts)
  - Re-configuration (e.g. Different logical topologies)
  - Easy to restore (e.g., in case the OS is deleted from FLASH)
- **Possibility to generate and capture network traffic**

Why is the lab remote?

- **H24 availability**
  - We can use it also in courses with large number of students
- **To control the lab better**
  - Student do no have physical access
    - E.g. they cannot break a cable

Sructure of the lab



Characteristics

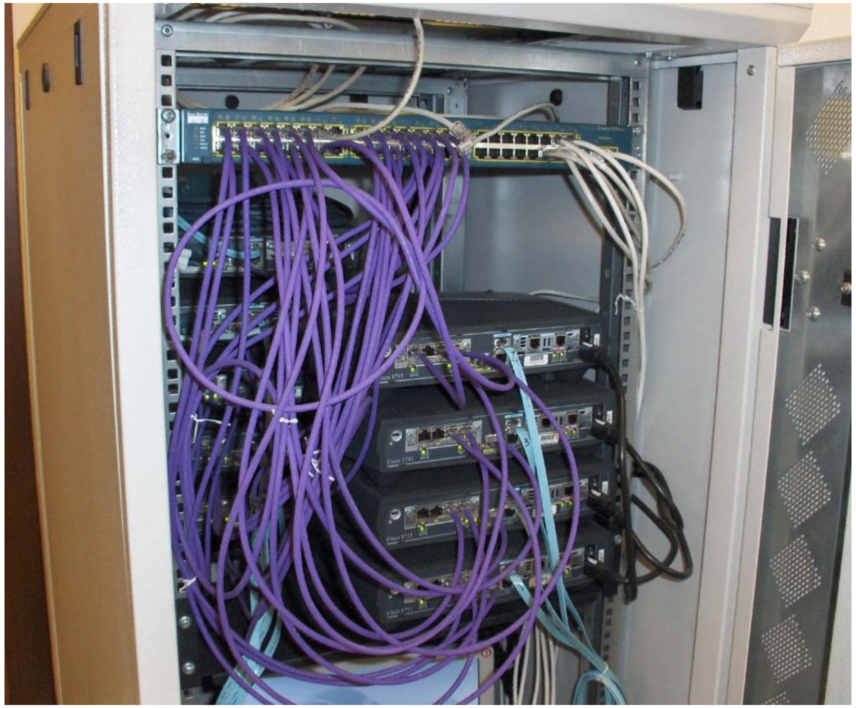
- 9 routers, controlled by a single PC
- Remote access o the “master” server
- Possibility to change the logical topology by reconfiguring the intermediate switch

How the lab looks like



General view

Routers details



Physical devices

- **Router: Cisco 1700 / Cisco 870**



  - Entry-level
    - Low cost, but it maintains all the features of the high-end devices (although it is slower)
  - Maximum size for FLASH and RAM
  - “Switched” ports (can be user either as a router, or as a switch)
- **Switch: Cisco 2950**



  - Reconfigurable L2 switch, VLAN, 2 GE ports (for sniffing)
- **Server: standard PC, Windows 2003 Server**

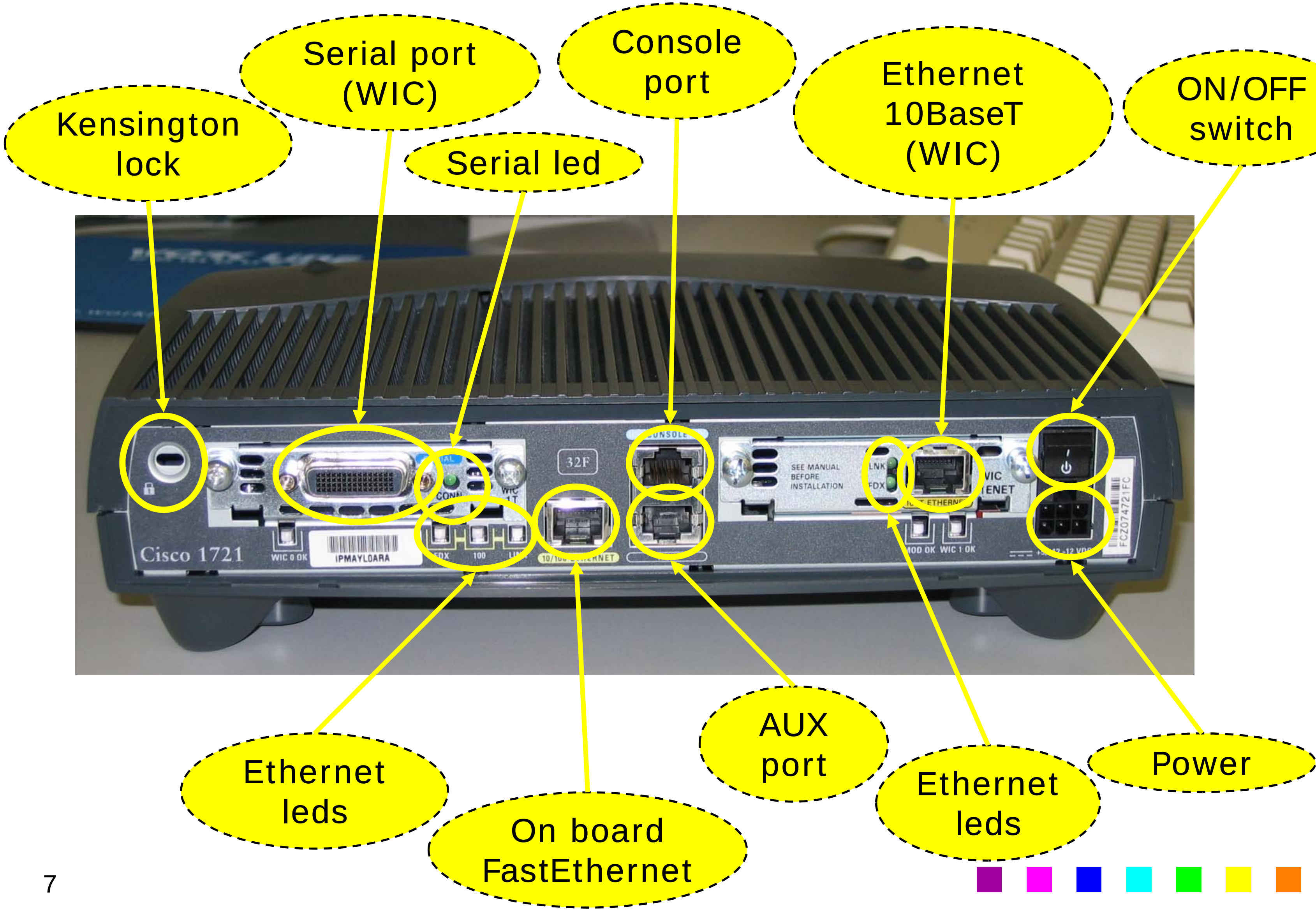


  - Pentium 4HT, 3.0GHz, 1GB RAM, 40GB HD
  - Windows 2003
    - RDP is currently the best solution for remote desktop
  - Multi-serial card

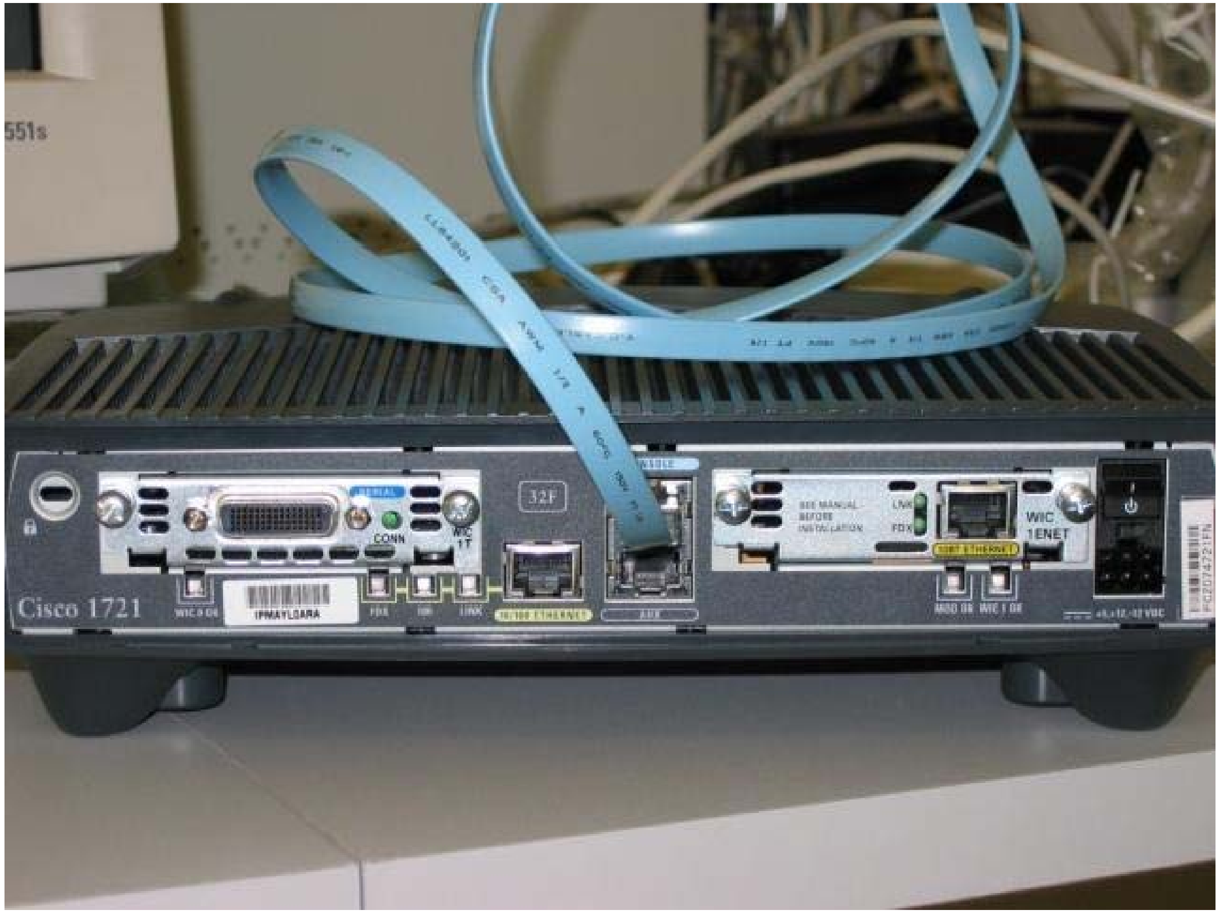


- **Total cost**
  - About 15K€

Rear view of a router: Cisco 1721

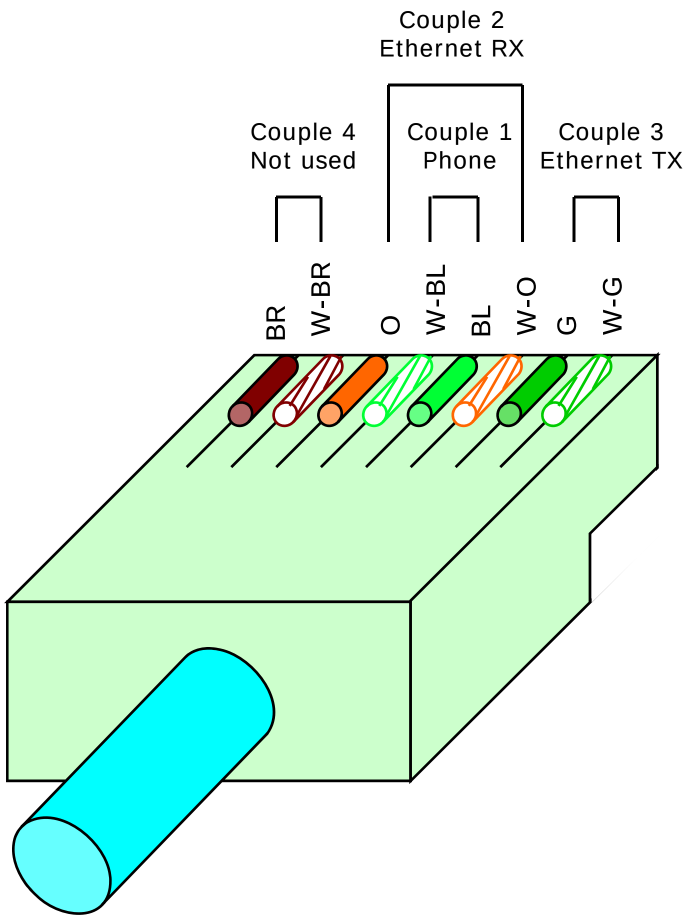


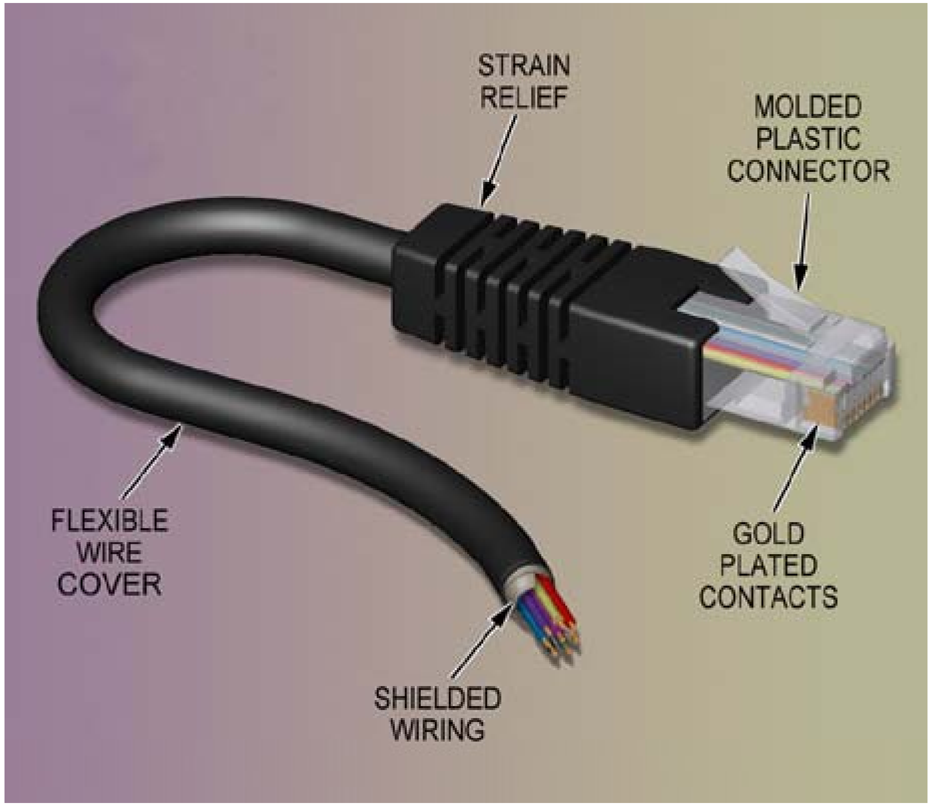
Connection between devices: console



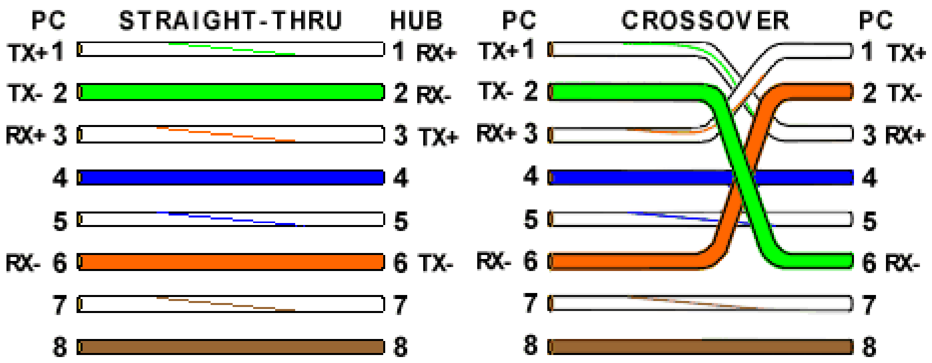
Console cable: usually RJ45 on one site, DB9 on the other side
(often made with a straight Ethernet cable with one adapter on one side)

Ethernet cables (1)





Ethernet cables (2)



Ethernet/FastEthernet cable

GigabitEthernet cable

Pin	Straight-thru Color	Straight-thru Signal	Crossover Color	Crossover Signal
1	W-G	TRD0+	W-O	TRD1+
2	G	TRD0-	BL	TRD1-
3	W-O	TRD1+	W-G	TRD0+
4	BL	TRD2+	W-BR	TRD3+
5	W-BL	TRD2-	BR	TRD3-
6	BL	TRD1-	G	TRD0-
7	W-BR	TRD3+	BL	TRD2+
8	BR	TRD3-	W-BL	TRD2-

DTE / DCE cables

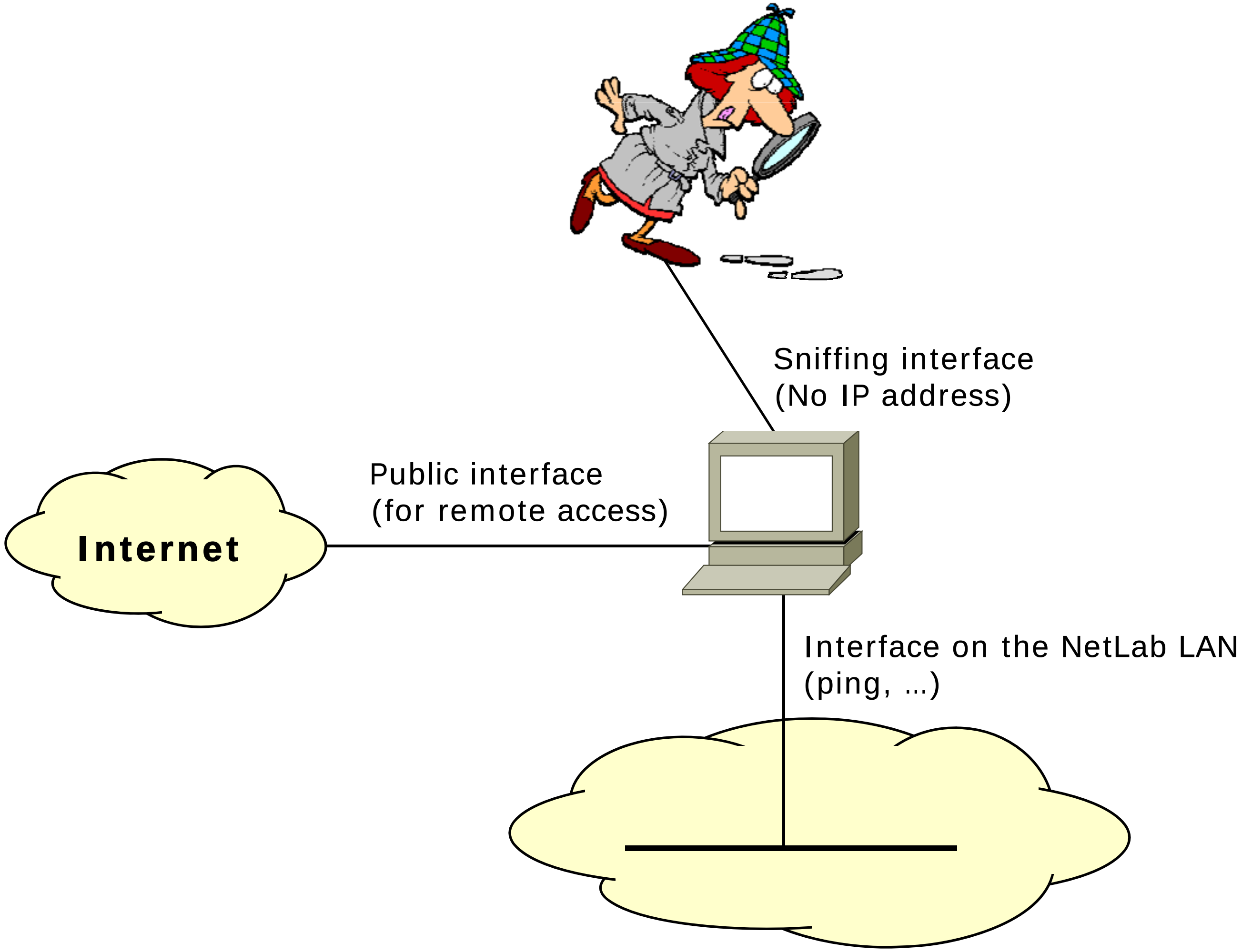


DCE/DTE: usually connected to a geographical modem (e.g. HDSL)
Lab: connected back-to-back (required to set the interface speed on the DCE)

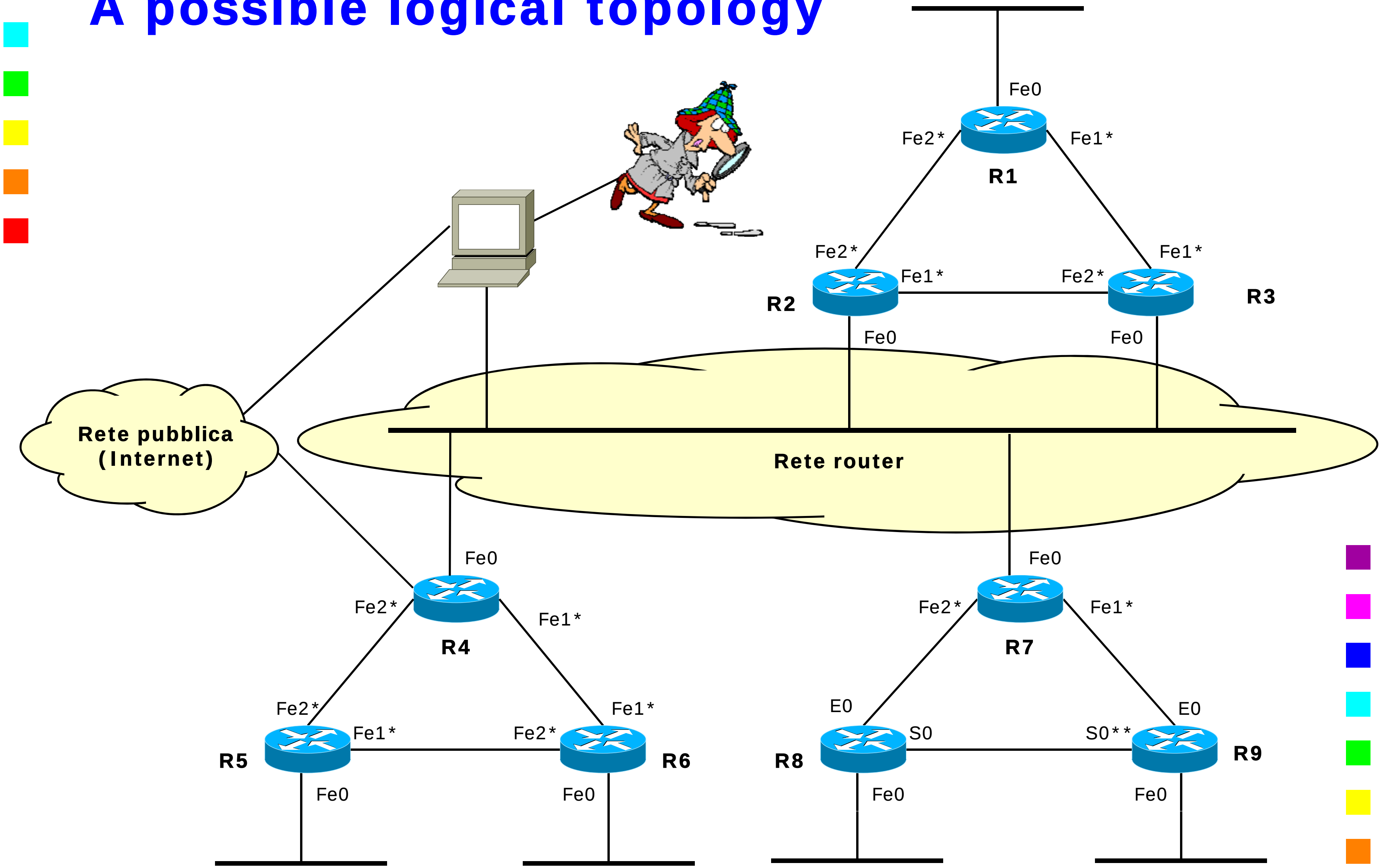
Multiserial card



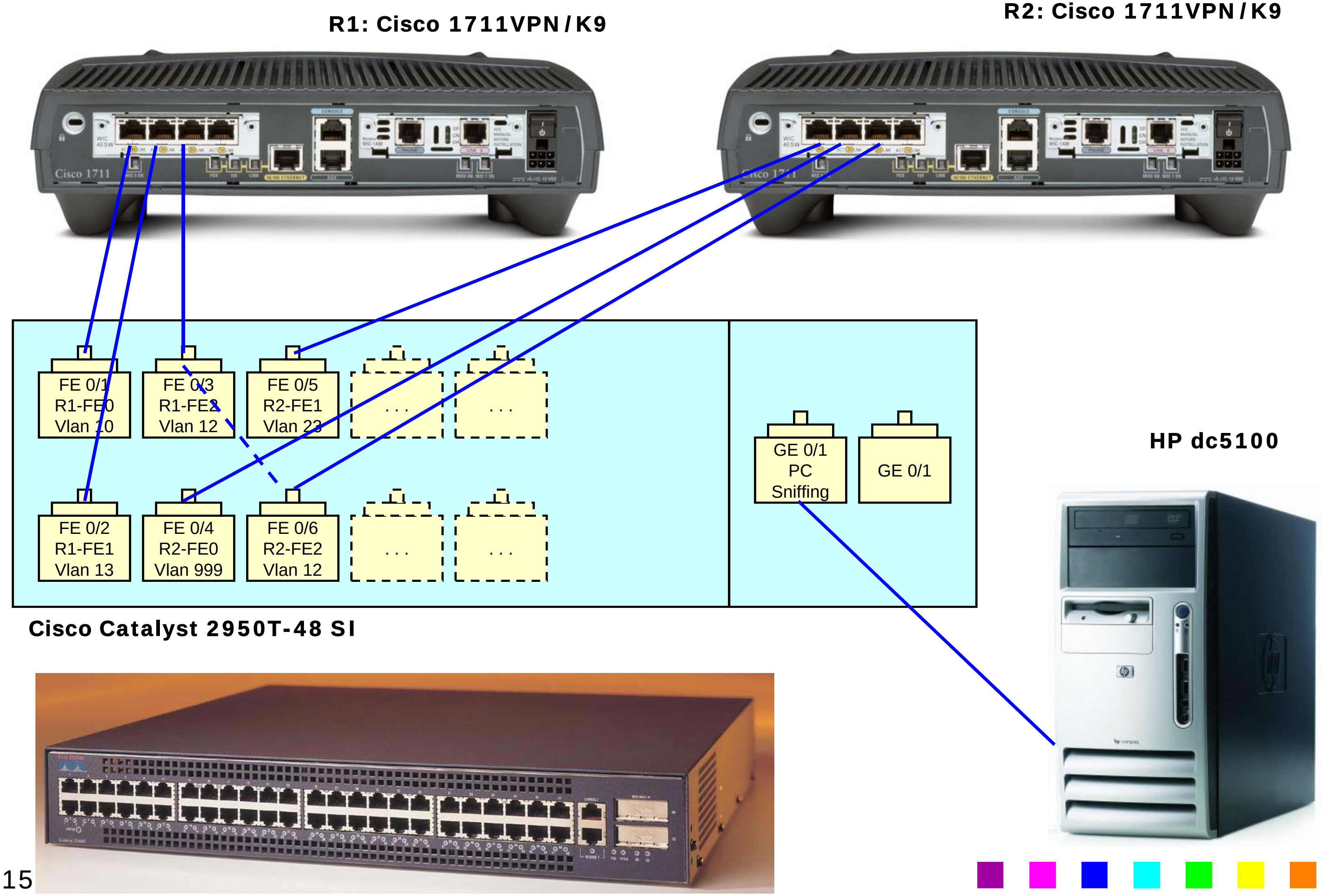
The Netlab server



A possible logical topology

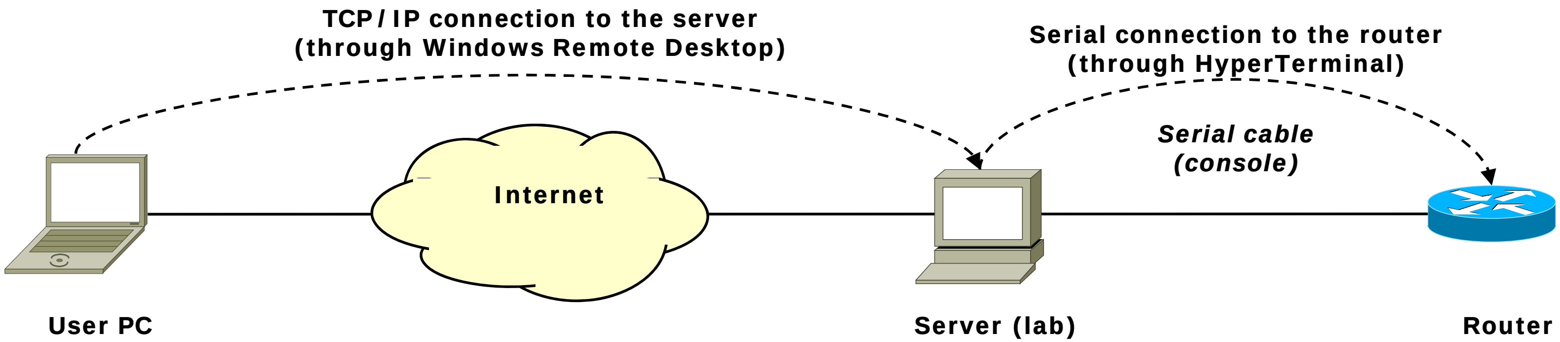


Physical topology

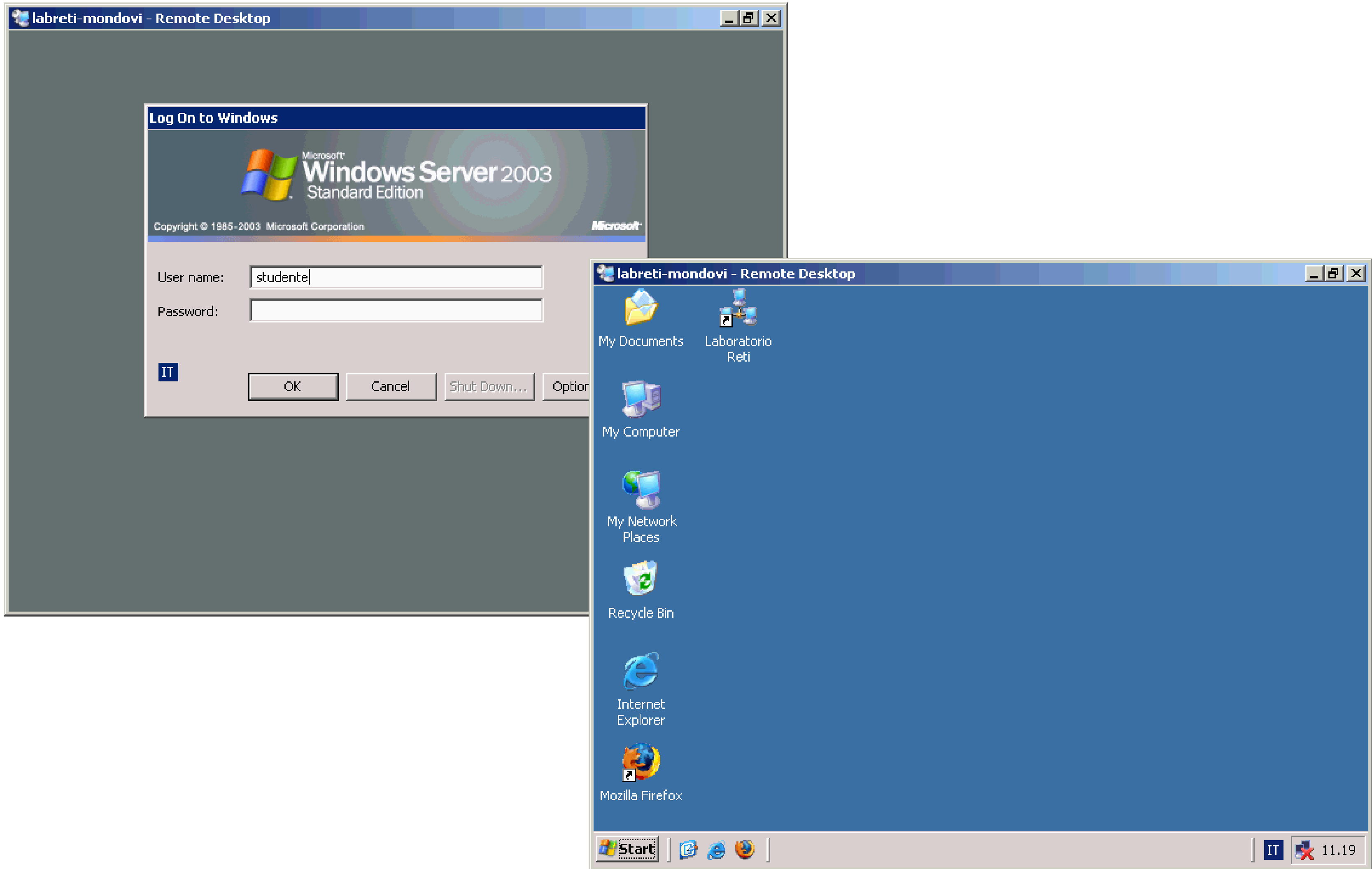


Access to the remote lab (1)

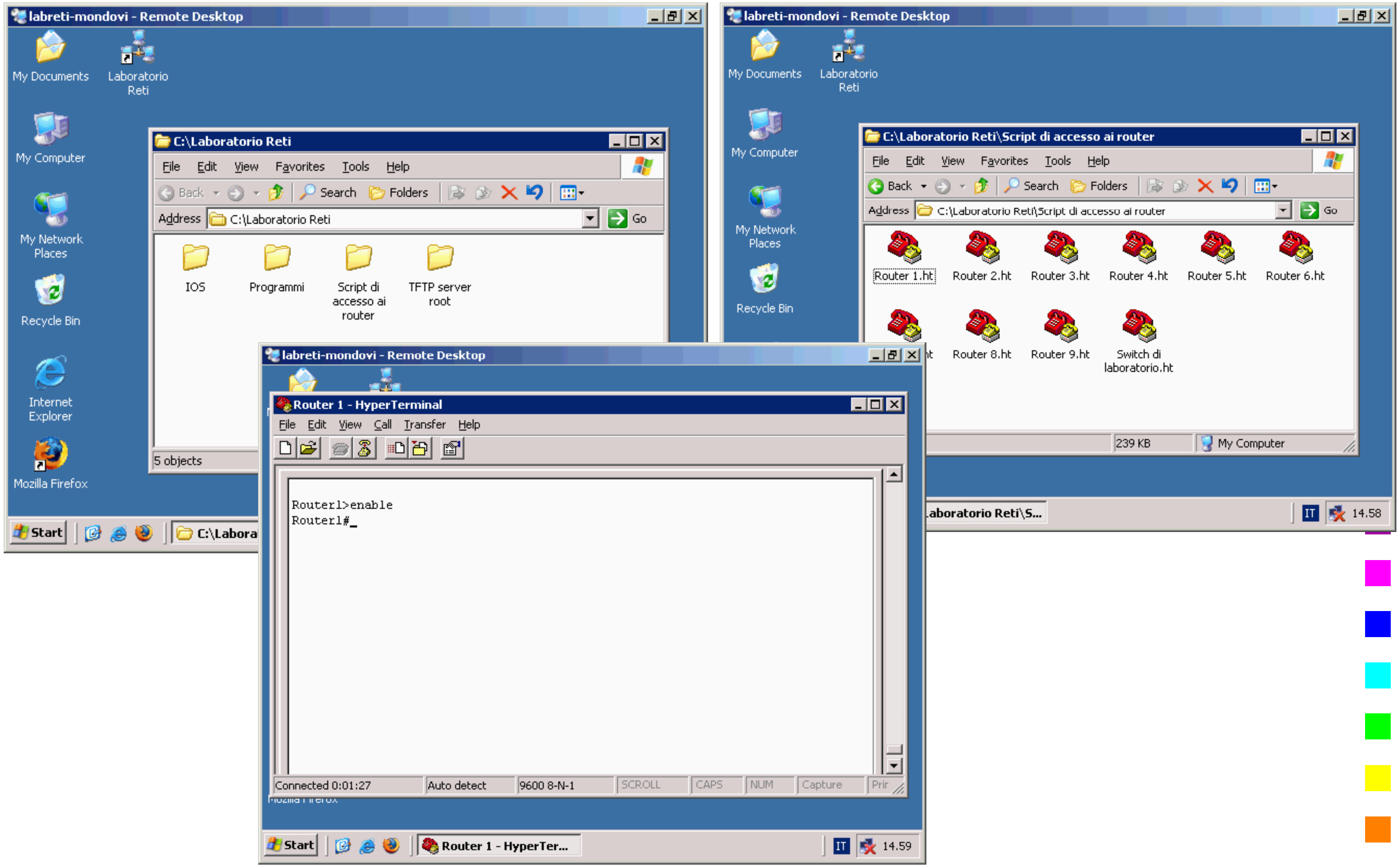
- **Physical address of the Windows 2003 servers**
  - Labreti-mondovi.ipv6.polito.it
  - Labreti-torino.ipv6.polito.it
- **Remote Desktop**
  - Windows XP/Vista: Use Remote Desktop Connection
  - UNIX: use *rdesktop*



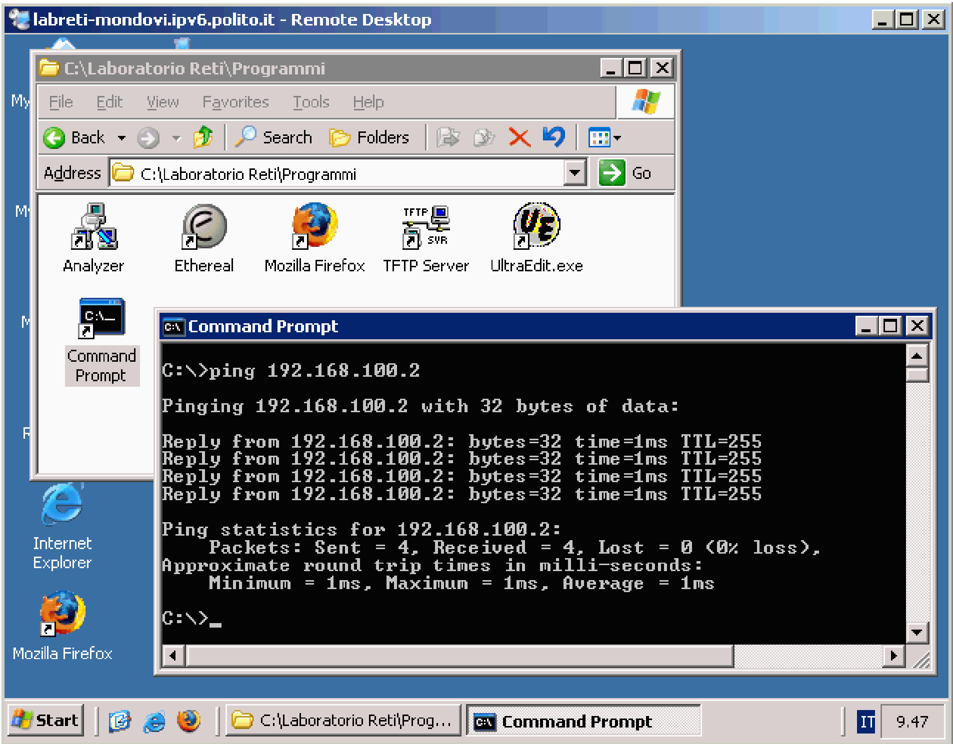
Access to the remote lab (2)



Access to the remote lab (3)



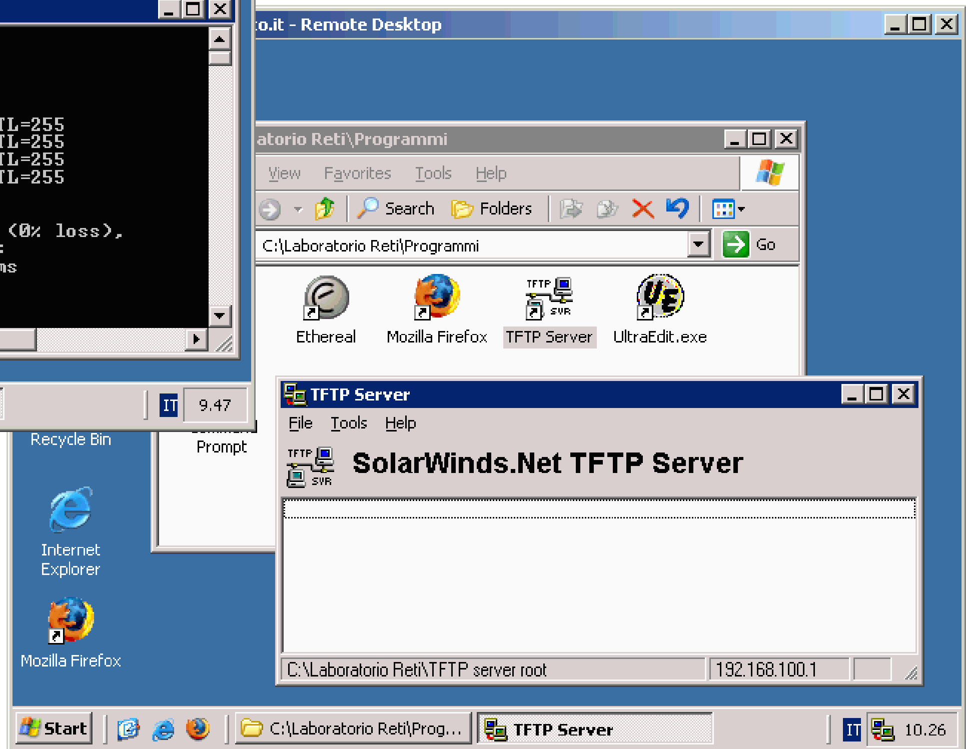
Available apps (1)



Command prompt

For ping, traceroute...

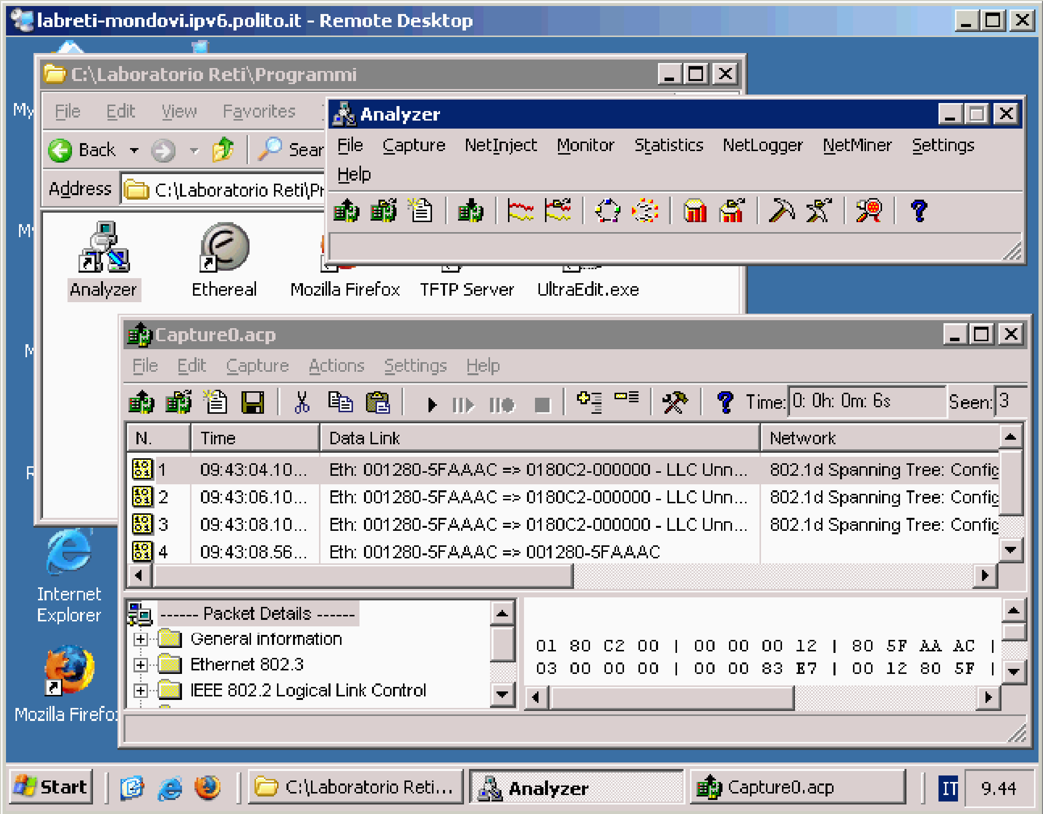
Please take in mind which interface the server is using, and the availability of an IP path



TFTP server

- Server not active by default (security issues)
- Please note the root folder

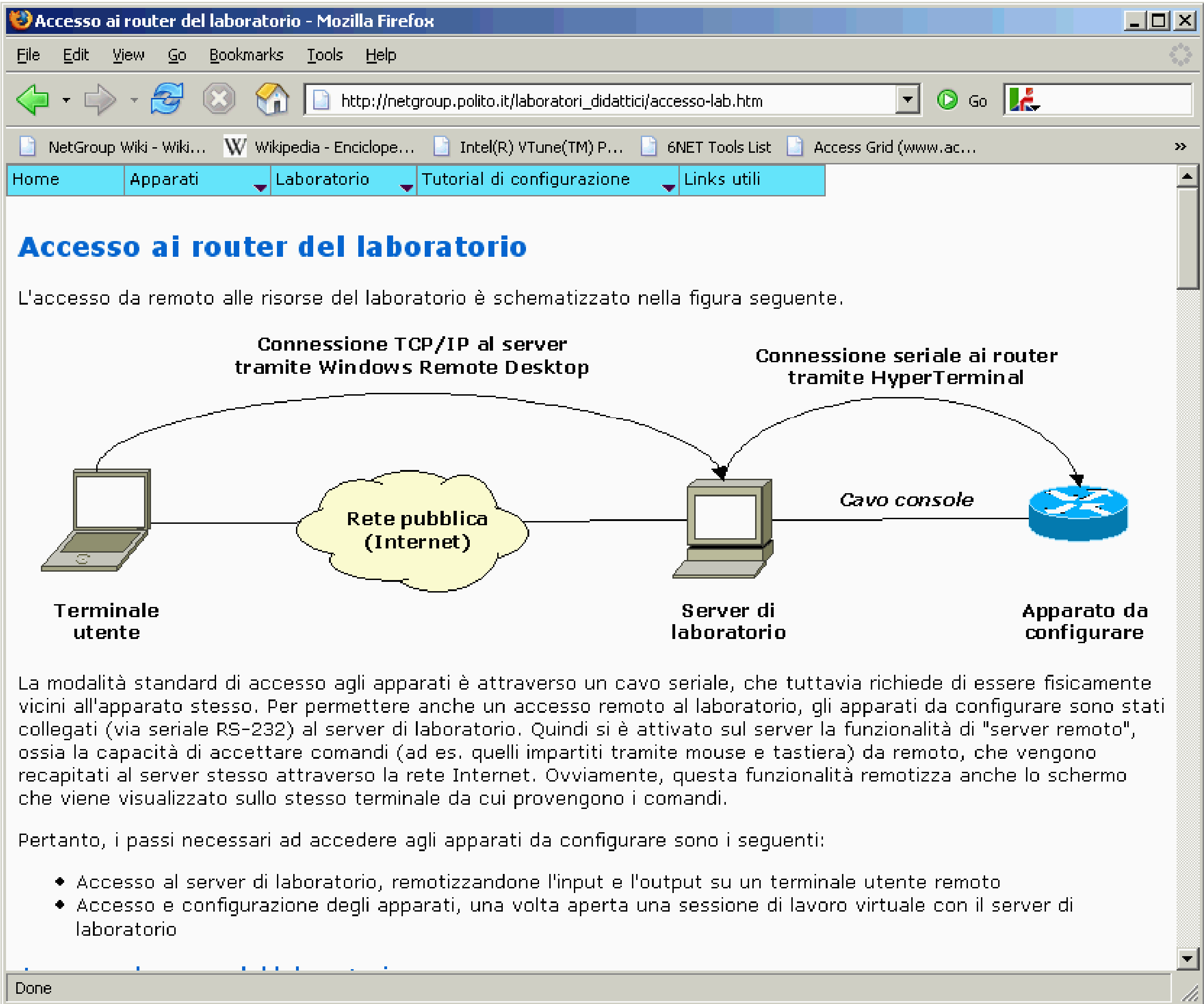
Available apps (2)



Interfaces:

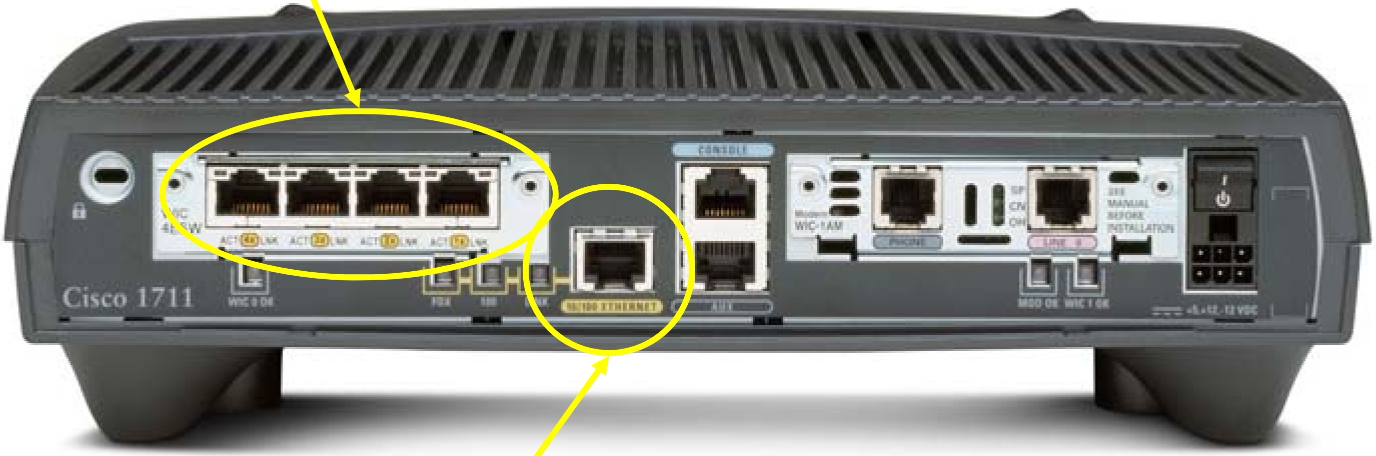
- Sniffing interface (passive interface, sniffing only)
    - Captures traffic flowing on *all* the other interfaces (except serial links)
    - Captures all traffic (so, please set the proper filter)
- Interface toward routers backbone LAN (active interface)

Online website



Some tips: switched/routed interfaces

Switched Ethernet interfaces

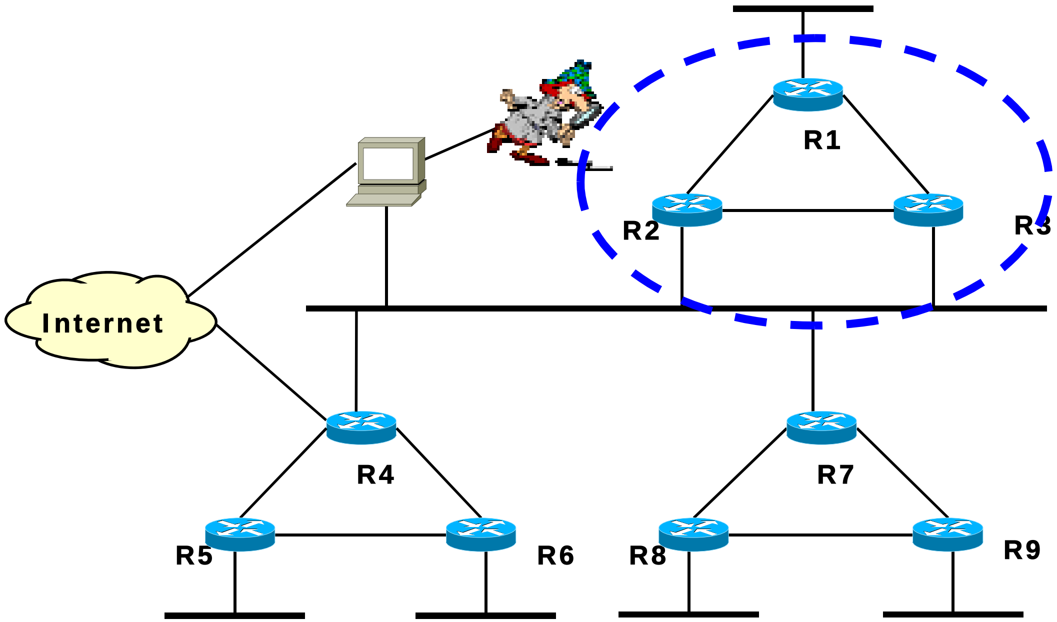


Routed Ethernet interface

!! Please take care about interfaces marked with “” on the network map!!*

Some tips: Groups and Workplaces

- **Groups**
  - Max 4 students/group
  - Each group has its own password (ask the Assistant for credentials)
  - Please use your workplace (not the entire physical topology)
  - Workplace may vary according to the different assigment



Some tips: logistics

- **Remote Desktop**
  - Log-off explicitly
  - Please do not DISCONNECT or CLOSE
    - **!! Router may be blocked !!**
- **Access to routers**
  - Please refer to the appriate slides
  - !! Remember to inizialize routers before use !!
- **When capturing traffic with Analyzer**
  - Please check that you are using the sniffing interface

Some tips: assistance and lab hours

- **Routers are available H24, assistance is not**
  - A professor will be available only during lab hours for consultancy
  - Lab hours are NOT indended as the sole time for lab exercises
    - In other terms, you have to complete your exercises at home, and come to the lab if you have trouble
    - This is valid only for assigments involving Cisco routers
- **Suggestions:**
  - Do your exercises at home, then come to the lab if you need help
  - In this case, please bring with you all the required material
    - Router configs (time is always missing... So better having configs ready)
    - Valid accounts in order to be able to reproduce the problem on the routers)

Lab and assistance

- **Lab hours can be used as consultancy hours**
- **If you want to get a better use of this time, please do your exercises at home, and if something does not work, please come and ask**
  - You have to try before asking
  - If something does not work, please come with your configuration scripts ready

Some tips: troubleshooting

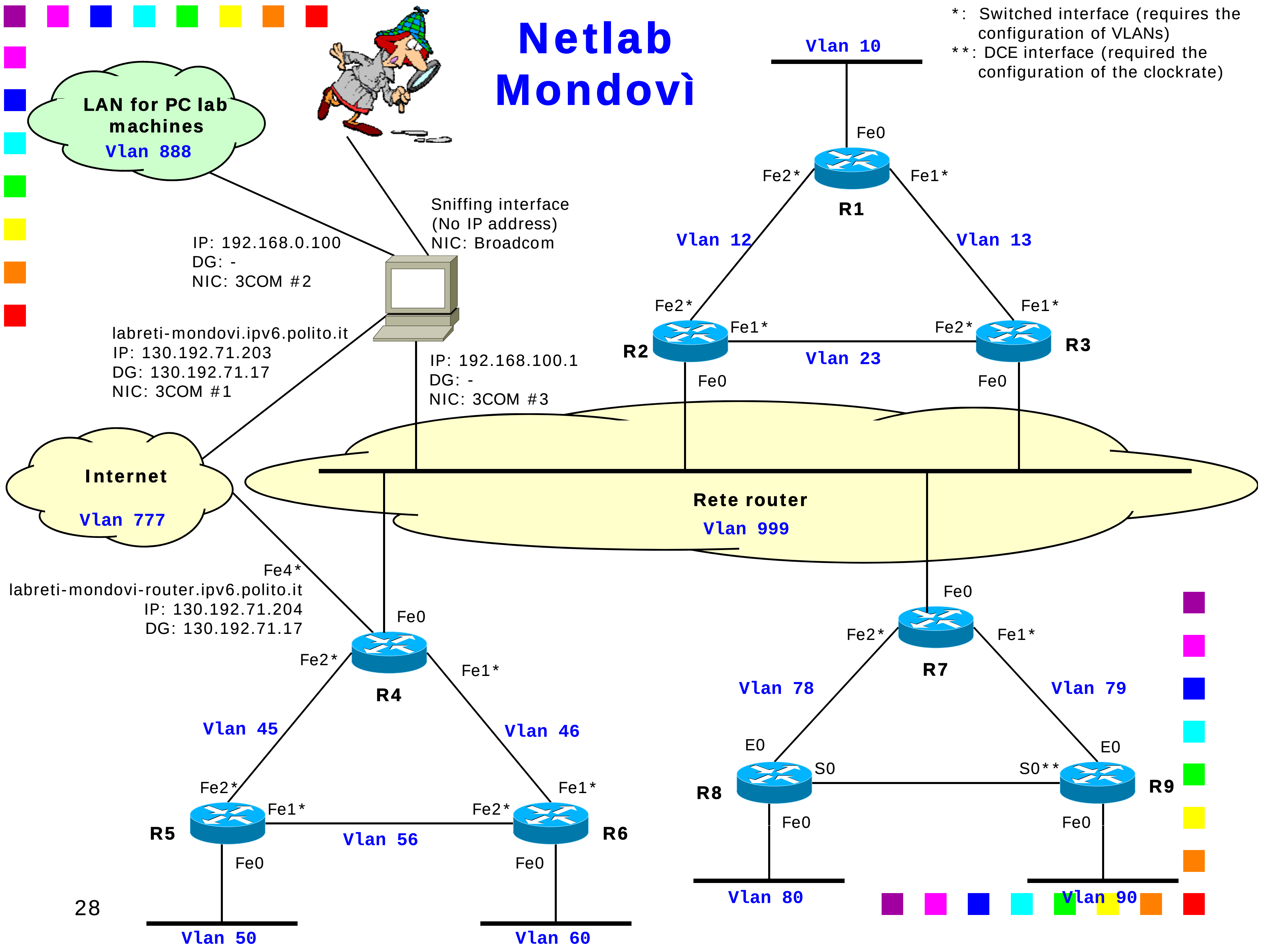
- **Routers are real devices so, you may expect...**
  - Strange behaviours
  - Cable not working
  - Need to reboot the device
- **If your target destination does not reply to your pings...**
  - Is your local interface up? (interface + line)
  - Is there a route to the remote destination?
  - Is your interface replying to a local "ping"?
  - Is the interface on the other side of the link replying to a "ping"?
  - Switch to the next router and repeat these steps

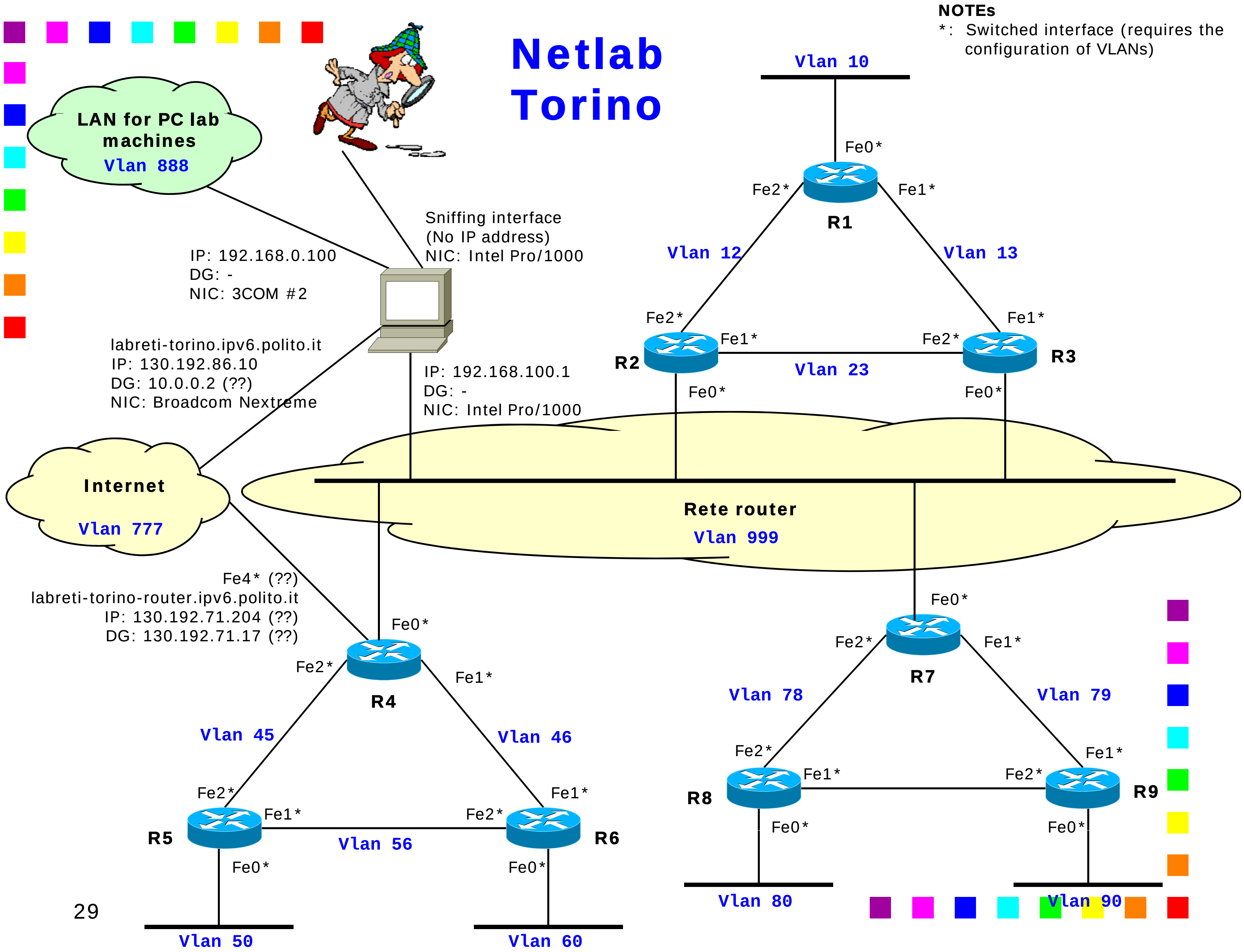
Netlab Mondovì

NOTES

*: Switched interface (requires the configuration of VLANs)

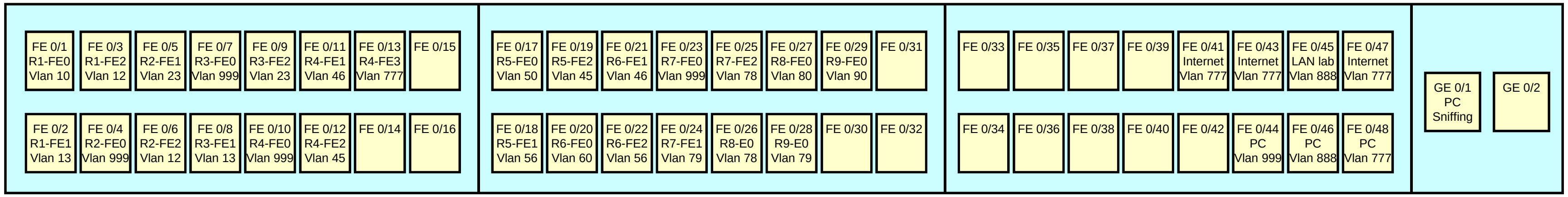
**: DCE interface (required the configuration of the clockrate)



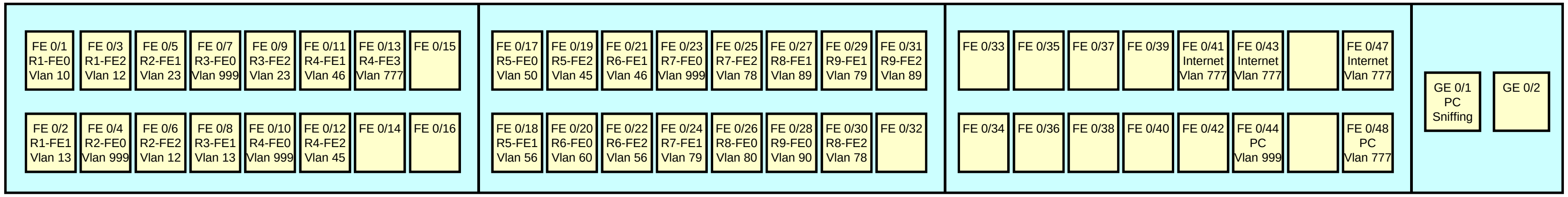


NOTEs
*: Switched interface (requires the configuration of VLANs)
Netlab
Torino
LAN for PC lab machines
Vlan 888
Sniffing interface
(No IP address)
NIC: Intel Pro/1000
IP: 192.168.0.100
DG: -
NIC: 3COM #2
labreti-torino.ipv6.polito.it
IP: 130.192.86.10
DG: 10.0.0.2 (??)
NIC: Broadcom Nextreme
IP: 192.168.100.1
DG: -
NIC: Intel Pro/1000
Internet
Vlan 777
Rete router
Vlan 999
Fe4* (??)
labreti-torino-router.ipv6.polito.it
IP: 130.192.71.204 (??)
DG: 130.192.71.17 (??)
Vlan 10
Fe0*
Fe2*
Fe1*
R1
Vlan 12
Vlan 13
Fe2*
Fe1*
Fe2*
Fe1*
R2
R3
Vlan 23
Fe0*
Fe0*
Fe0*
Fe2*
Fe1*
R4
Vlan 45
Vlan 46
Fe2*
Fe1*
Fe2*
Fe1*
R5
R6
Vlan 56
Fe0*
Fe0*
Vlan 50
Vlan 60
Fe0*
Fe2*
Fe1*
R7
Vlan 78
Vlan 79
Fe2*
Fe1*
Fe2*
Fe1*
R8
R9
Fe0*
Fe0*
Vlan 80
Vlan 90

Physical topology



Cisco Catalyst 2950T-48 SI - Mondovì



Cisco Catalyst 2950T-48 SI - Torino